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# WHAT NOW?

## LNG and the ‘carbon budget,’ explained



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Marla Orenstein champions the responsible development of the West’s natural resources for the benefit of all. Her focus has been on ensuring the well-being of communities in the context of development and change.

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Wildly opposing views about the environmental impacts of Liquefied Natural Gas (LNG) projects exist in Canada – views that are so divergent as to be almost irreconcilable. *LNG lauded as environmental saviour*, says the Northern Sentinel.<sup>1</sup> *BC LNG touted as cleanest in the world*, says JWN.<sup>2</sup> *LNG Canada could be ‘carbon bomb’ that blows up B.C.’s climate goals, critic warns*, reports the CBC.<sup>3</sup>

Well, which is it? The real story has nuance. In this policy brief, we tell that story, and explain how such opposing viewpoints can be held.

With LNG, we are seeing the birth of an entire new sector in Canada. In Kitimat, B.C., LNG Canada has started construction, and others are in the process of applying for approval. But LNG ties into a much larger story about how we count carbon emissions – one that has important implications for Canada’s economy and climate change.

### Canada’s emerging LNG industry

British Columbia and Alberta both have abundant natural gas resources. As a result, there has been a push to develop LNG export facilities in Canada, primarily in B.C., to be able to supply Asian markets.

→ LNG Canada, a joint venture of Royal Dutch Shell in partnership with Petronas, PetroChina, Mitsubishi and Kogas, was the first Canadian LNG export facility to take a Final Investment Decision, and construction began in

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### What is LNG?

LNG is natural gas that has been cooled and turned into a liquid that can be transported by specially equipped ships. At its destination, the gas is warmed and “gasified” and used locally – mostly for electricity generation and industrial or residential heating, but also (in some places) as a transportation fuel as well as a feedstock for fertilizers and other products.

In recent years, the demand for LNG has been increasing, particularly in Asia and Europe, and it's expected to continue through at least the year 2035.<sup>4</sup> The leaders in world supply are Qatar, Australia, Malaysia, the U.S., Nigeria and Russia.<sup>5</sup>

LNG is an attractive energy source as it doesn't create the same sort of local air pollution as coal or oil. It also has a lower greenhouse gas (GHG) emissions intensity. For the same amount of energy, natural gas releases about 24% less CO<sub>2</sub> than oil, and 46% less than coal.<sup>6</sup>

Although the emissions profile of natural gas is not as good as renewables such as wind, hydro or solar, the International Energy Agency credits natural gas with having helped China avoid 60 megatonnes of emissions in 2018 alone.<sup>7</sup>

October 2018. Located near Kitimat, B.C., it is a huge project with a total cost estimated at upwards of \$40 billion: the largest ever single private-sector energy investment in Canada. It is expected to come online in 2024/25, with two trains exporting 14 million tonnes per year. At full build-out (of four trains), it would export 28 million tonnes per year, which is equivalent to 19% of Canada's total production in 2018.<sup>8</sup>

- Other LNG projects are set to follow: Woodfibre LNG, located near Squamish, B.C., is being built by a subsidiary of Singapore-based Pacific Oil & Gas Ltd. It is a smaller project at \$1.6 billion, and is set to export 2.1 million tonnes of LNG per year.
- Chevron and Woodside Petroleum's Kitimat LNG Project will be an all-electric facility producing 18 million tonnes per year.
- Énergie Saguenay is a \$14 billion pipeline and LNG project in Quebec. The project would send 11 million tons of gas per year to Europe and Asia, and would be powered entirely by hydroelectricity.
- And finally, a \$10 billion project to produce LNG for export to Europe is proposed for Goldboro, Nova Scotia, using Alberta natural gas.

When built, the Canadian LNG projects are expected to have by far the lowest greenhouse gas (GHG) emissions in the world.<sup>9</sup> The proposed plants are planning to use hydro-powered electricity for all (Woodfibre, Kitimat, Saguenay) or some (LNG Canada) of the power needs of the facility. Even when the full lifecycle of natural gas is taken into account – including upstream production – B.C. LNG will be substantially lower-emitting than coal, although not as low as sources such as nuclear, hydro, geothermal or other renewables.<sup>10</sup>

### So why the controversy?

So if there is demand, the product is cleaner and we have plentiful supply, why is there a controversy?

The controversy centres on GHG emissions – and in particular, how they should be counted.

### B.C.'s carbon 'budget'

In 2018, as part of the *Climate Change Accountability Act*, the B.C. government set a target of reducing greenhouse gases by 40 per cent by 2030 (compared to 2007 levels) and 80 per cent by 2050. Meeting these targets will require a decrease in emissions by almost 27 megatonnes (Mt) per year for 2030 and 54 Mt by 2050.

So far, the province has struggled to make progress. Even though emissions have declined from specific emitters, economic and population growth offset the gains. As of 2016 (the latest year for which data is available), the province's GHG emissions had decreased only 3.7% over baseline 2007 levels.<sup>11</sup>

Enter the LNG projects.

As noted earlier, the LNG projects being built or proposed in B.C. and Saguenay, Quebec could have the lowest GHG profiles in the world. But even so, they are still energy – and thus emissions – intensive, both at the LNG facilities themselves and associated upstream natural gas production.

Environment and Climate Change Canada estimated that the LNG Canada project would result in emissions of 4 Mt/year for the first phase of two trains.<sup>12</sup> The Pembina Institute estimated 8.6 Mt/year for the project by 2030 – which included 3.6 Mt from the terminal and an additional 5.0 Mt from associated upstream development.<sup>13</sup>

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This means that with the LNG projects, B.C. will have higher, not lower, emissions emanating from within provincial boundaries – further challenging its ability to meet its own stated targets.

Two basic facts are *not* in dispute:

- 1) The proposed Canadian LNG plants will have the lowest emissions intensities in the world.
- 2) They will result in an absolute increase in GHG emissions within Canada.

*What is primarily in dispute is what those emissions mean and whether they should be viewed as a net positive or negative.*

### Who emissions 'belong' to

What Canada committed to under the Paris Agreement, and what B.C. has done in its climate plan for example, is set out territorially based targets for GHG reductions. That is, an imaginary fence has been drawn around the province (or the country). We count all the emissions inside that fence at a particular point (2007 in the case of B.C.'s plan) and commit to producing less in the future (2030 or 2050).

While that is one way to understand and manage GHG emissions, it – like all other accounting methods – is an artificial construct that corresponds only imperfectly to the real world.

In the real world, GHG emissions are a **global** problem and not restricted to political borders – and the “best” climate plan is one that produces the maximum global reduction in emissions. And sometimes – as in the case of LNG Canada, Woodfibre, Saguenay and others – this *can* be at odds with the territorial accounting approach.

It comes down to the question of whether the LNG plants in Canada – which will increase local GHG emissions – will or will not result in a larger decrease in global emissions.

And the answer isn't simple.

### Will Canadian LNG displace coal in Asia?

Those who are supportive of Canadian LNG often make the argument that natural gas from Canada would displace the use of coal, especially for electricity generation in China. Estimates have been produced claiming that LNG could displace GHG emissions from coal by a factor of 10 – that the 4-8 Mt of GHGs associated with the LNG Canada project would result in a global GHG reduction of 60-90 Mt annually.<sup>14</sup>

If that is the case, the benefits of building LNG plants in Canada should be clear – and the projects should be something every Canadian is proud of.

But it isn't quite as simple as “LNG in, coal out.”

- China has previously stated that it intends to phase out its coal-fired electricity generation facilities. The share of coal in electricity generation declined from 80% in 2010 to 60% by 2017, and in 2016-2017, the government cancelled a number of coal-fired power plant permits. However, since that time, decommissioning has been halted and in 2018, China restarted construction on more than 50 gigawatts of coal-fired power plants that had been suspended.<sup>15</sup> In addition, it is funding the building of over 300 coal-fired plants in other countries across Asia and Africa.<sup>16</sup> Most of the plants in China are “ultra-low emissions” facilities. However, the “ultra-low” refers primarily to “smog” particles (SO<sub>2</sub>, NO<sub>x</sub> and particulate matter), and not to GHGs, which are only lower than older plants by about 30%.<sup>17</sup>
- LNG may make a difference in residential heating. There has been a push – spurred in large part by China's bad air quality in urban areas – to encourage coal-to-gas switching for households.<sup>18</sup> Over the last 20 years, the switchover has been dramatic – and China wants it to continue. B.C.'s LNG would represent the cleanest source of gas for this use – not only lower emissions than other suppliers, but also lower than the alternatives that China is considering: biogas production and producing gas from coal (“coal gasification”).
- In 2019, Japan signed an agreement with LNG Canada to purchase 1.2 million tonnes per year – about 10% of the project's output. This is part of Japan's explicit efforts to reduce reliance on Middle East oil, which it does not see as a secure supply<sup>19</sup> – but the move also results in a lower GHG emissions intensity. LNG accounts for about 40% of Japan's electricity mix, but does not appear to be displacing coal for power generation.<sup>20</sup>

- In India, coal is a major source of energy, supplying 74% of electricity generation and 45% of primary energy demand.<sup>21</sup> Like China, however, urban air pollution – rather than GHG emissions – is the major driver for change. In practice, LNG is unlikely to increase in India in the short- or medium-term, as costs and a lack of domestic pipeline infrastructure remain barriers. It appears more likely that India's rising energy needs will be powered by an increase in coal, supplemented by solar.
- An argument has been made that building LNG infrastructure could “lock in” natural gas over zero-emissions sources such as solar or wind.<sup>22</sup> However, it is important to recognize the potential role of natural gas as a complementary source of power for intermittent renewables. The likeliest scenario is that both LNG and renewables are used together to feed a growing energy demand.

In the end, as has been stated by others, it's complicated.<sup>23</sup> And describing B.C. LNG as either an “environmental saviour” or a “carbon bomb” with respect to GHG emissions is somewhat misleading on both counts.

## Conclusion

The LNG issue is the most high-profile example of an emissions counting problem that Canada is going to face time and time again over the next decade.

How will we know if our actions are making a real and meaningful impact in the areas we want them to (such as reducing global GHG emissions)? And how will we know if we are causing a cascade of unintended problems? GHG emissions are real and important, but any accounting method we choose (territorially based, consumption-based, developing a “carbon budget,” etc.) will be an imperfect representation of an enormously complex system.

Nevertheless, it influences real-world choices. And these choices have both local effects and global ones, both on GHG emissions and other things Canadians value, including local economic prosperity, international political stability and reducing global poverty. Canadians have big decisions to make – and need the right information to make them.

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Canada West Foundation  
ISBN 978-1-989323-38-0

Canada West Foundation is a registered Canadian charitable  
organization incorporated under federal charter. (#11882 8698 RR 0001)